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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,044	12/01/2003	Natsuki Makino	2003_1739A	1464

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EXAMINER	
WILKINS III, HARRY D	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/724,044	MAKINO ET AL.	
	Examiner	Art Unit	
	Harry D. Wilkins, III	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16 and 28-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16 and 28-30* is/are rejected.

7)☒ Claim(s) *31-34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 7 December 2007 has been entered.

Status

2. The rejection under 35 U.S.C. 112, first paragraph of claim 28 has been withdrawn in view of Applicant's clarifying amendment.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 2002/0130049) in view of Kimura et al (US 2001/0024691).

Chen et al teach (see figures 4-8 and related description) an electrolytic processing apparatus including a substrate holder (head assembly 478) for holding a substrate and a first electrode (802) to make contact with the substrate for passing

electricity to a processing surface of the substrate, an electrode head including a second electrode (426) and a polishing surface (428) facing the processing surface of the substrate held by the substrate holder, an electrolytic solution injection portion (440) for injecting an electrolytic solution between the processing surface of the substrate held by the substrate holder and the second electrode, a relative movement mechanism (468) for pressing the polishing surface of the electrode head against the substrate held by the substrate holder and is capable of operating such that during electroplating the wafer is held apart from the polishing surface and during electrolytic etching the wafer is held in contact with the polishing surface for pressing the polishing surface of the electrode head against the substrate held by the substrate holder and a power source (not shown) for applying a voltage between the first and second electrodes. Since the apparatus of Chen et al was used for either electrodeposition or electropolishing (see paragraphs 69, 70 or 77) the power supply was adapted for alternating the direction of electric current such that the second electrode was either a cathode or an anode.

The press mechanism of Chen et al included a spring element (532). This spring acted to push the substrate against the polishing surface, because it biased the support plate (506) away from the mounting plate (530), i.e.-in a direction towards the polishing pad. The spring was arranged between the relative motion mechanism and the electrode head.

Thus, Chen et al fail to teach adding a high resistance structure between the second electrode and the polishing surface.

Kimura et al teach (see figures 42-51 and related description, particularly paragraph 201) interposing a high resistance structure between an electrically-biased substrate and the counter electrode for the purpose of increasing the uniformity of the electrodeposited film.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a high resistance structure as taught by Kimura et al to the apparatus of Chen et al for the purpose of increasing uniformity of the electrodeposited film.

Regarding claims 2-5, Chen et al teach making the polishing pad (428) from a polyurethane foam (see paragraph 74) and supported by a support (444). With respect to claims 2 and 3, it would have been obvious to one of ordinary skill in the art to have utilized the relatively rigid high resistance structure of Kimura et al for the support diffuser plate (444) of Chen et al in order to reduce the number of parts needed for assembling the device.

Regarding claim 7, the press mechanism of Chen et al would have been adjustable by replacing the spring (532) with a different spring having a different compression constant.

Regarding claim 8, the type of solution used within the claimed apparatus is not accorded patentable weight. See MPEP 2114. However, it is noted that even if the limitation were granted patentable weight, Chen et al and Kimura et al teach using an electroplating solution.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 2002/0130049) in view of Kimura et al (US 2001/0024691) as applied above to claim 1 and further in view of Matsuda et al (US 6,375,823).

Chen et al and Kimura et al fail to teach that the surface of the high resistance structure facing the substrate was used as the polishing surface.

However, Kimura et al do teach that the high resistance structure was made of porous ceramic materials.

Matsuda et al teach (see abstract and col. 9, line 60 to col. 10, line 24) that polishing surfaces for polishing of semiconductor wafers could have been made from porous ceramic materials instead of polymeric foams.

Therefore, since the surface of the high resistance structure was known in the prior art to be capable of use as a polishing surface, it would have been obvious to one of ordinary skill in the art to have incorporated the high resistance structure of Kimura et al into the apparatus of Chen et al to replace both the support and the polishing pad, and to have utilized the high resistance structure as the polishing surface.

6. Claims 9-13, 15-16 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 2002/0130049) in view of Kimura et al (US 2001/0024691) and Talieh (US 6,176,992).

Chen et al teach (see figures 4-8 and related description) an electrolytic processing apparatus including a substrate holder (head assembly 478) for holding a substrate and a first electrode (802) to make contact with the substrate for passing electricity to a processing surface of the substrate, an electrode head including a

second electrode (426) and a polishing surface (428) facing the processing surface of the substrate held by the substrate holder, an electrolytic solution injection portion (440) for injecting an electrolytic solution between the processing surface of the substrate held by the substrate holder and the second electrode, a relative movement mechanism (468) for pressing the polishing surface of the electrode head against the substrate held by the substrate holder and is capable of operating such that during electroplating the wafer is held apart from the polishing surface and during electrolytic etching the wafer is held in contact with the polishing surface for pressing the polishing surface of the electrode head against the substrate held by the substrate holder and a power source (not shown) for applying a voltage between the first and second electrodes. Since the apparatus of Chen et al was used for either electrodeposition or electropolishing (see paragraphs 69, 70 or 77) the power supply was adapted for alternating the direction of electric current such that the second electrode was either a cathode or an anode.

The press mechanism of Chen et al included a spring element (532). This spring acted to push the substrate against the polishing surface, because it biased the support plate (506) away from the mounting plate (530), i.e.-in a direction towards the polishing pad. The spring was arranged between the relative motion mechanism and the electrode head.

Thus, Chen et al fail to teach (1) adding a high resistance structure between the second electrode and the polishing surface (2) performing "face up" processing of the substrate.

Kimura et al teach (see figures 42-51 and related description, particularly paragraph 201) interposing a high resistance structure between an electrically-biased substrate and the counter electrode for the purpose of increasing the uniformity of the electrodeposited film.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a high resistance structure as taught by Kimura et al to the apparatus of Chen et al for the purpose of increasing uniformity of the electrodeposited film.

Talieh teaches (see abstract, figures 1A, 1B and 2) that both "face up" and "face down" electrochemical mechanical processing techniques were known in the art of processing semiconductor wafers, and that both were known to be functional equivalents.

Therefore, it would have been obvious to one of ordinary skill in the art to have taken the "face down" processing apparatus of Chen et al and converted it to a "face up" processing apparatus, such as that shown by Kimura et al by providing a substrate holder for holding a substrate with its processing surface facing upward, an electrode head with the high resistance structure below the second electrode (i.e.-between the second electrode and the substrate) and with a polishing surface facing at the bottom of the high resistance structure (i.e.-facing the substrate processing surface.

Regarding claims 10-13, Chen et al teach making the polishing pad (428) from a polyurethane foam (see paragraph 74) and supported by a support (444). With respect to claims 2 and 3, it would have been obvious to one of ordinary skill in the art to have utilized the relatively rigid high resistance structure of Kimura et al for the support

diffuser plate (444) of Chen et al in order to reduce the number of parts needed for assembling the device.

Regarding claim 15, the press mechanism of Chen et al included a spring (532).

Regarding claim 16, the type of solution used within the claimed apparatus is not accorded patentable weight. See MPEP 2114. However, it is noted that even if the limitation were granted patentable weight, Chen et al and Kimura et al teach using an electroplating solution.

Regarding claim 28, Chen et al teach (see figure 4) that the electrode head included a housing (434) and a support (444) arranged so as to close an opening of the housing, with the polishing pad being attached to the external surface of the support. In view of the teachings of Talieh and Kimura et al, it would have been obvious to have reversed the positions of the substrate holder and electrode head. When doing so, the support would close a "lower" opening of the housing and the polishing pad would have been attached to a "lower" surface of the support (444). It would have been within the ability of one of ordinary skill in the art to have arranged the high resistance structure taught by Kimura et al within the housing (434) of Chen et al, between the support (444) and the electrode (426) to have provided adequate increase in uniformity of processing.

Regarding claims 29 and 30, Talieh teach (see abstract, figures 1A, 1B and 2) that both "face up" and "face down" electrochemical mechanical processing techniques were known in the art of processing semiconductor wafers, and that both were known to be functional equivalents. When processing wafers in the "face up" position, the wafer

would have been held in a fixed position, such as that shown by Kimura et al, with the relative movement provided to the electrode head.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (US 2002/0130049) in view of Kimura et al (US 2001/0024691) and Talieh (US 6,176,992) as applied above to claim 9 and further in view of Matsuda et al (US 6,375,823).

Chen et al, Kimura et al and Talieh fail to teach that the surface of the high resistance structure facing the substrate was used as the polishing surface.

However, Kimura et al do teach that the high resistance structure was made of porous ceramic materials.

Matsuda et al teach (see abstract and col. 9, line 60 to col. 10, line 24) that polishing surfaces for polishing of semiconductor wafers could have been made from porous ceramic materials instead of polymeric foams.

Therefore, since the surface of the high resistance structure was known in the prior art to be capable of use as a polishing surface, it would have been obvious to one of ordinary skill in the art to have incorporated the high resistance structure of Kimura et al into the apparatus of Chen et al to replace both the support and the polishing pad, and to have utilized the high resistance structure as the polishing surface.

Response to Arguments

8. Applicant's arguments filed 7 December 2007 have been fully considered but they are not persuasive. Applicant has argued that Chen et al fails to teach a

compression spring arranged to apply a continuous elastic force between a relative movement mechanism and the electrode head.

In response, the Examiner disagrees. The spring of Chen et al applies a force to the back of the substrate holder to bias the substrate towards the polishing surface. Thus, this biasing force is between the relative movement mechanism (that portion of the apparatus above the spring) and the electrode head (the polishing surface).

Allowable Subject Matter

9. Claims 31-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: the prior art fails to teach or suggest the claimed structure associated with the first and second plates, the stopper and the compression spring.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Harry D Wilkins, III
Primary Examiner
Art Unit 1795

hdw